查询APL1431供应商

APL1431

Adjustable Precision Shunt Regulator

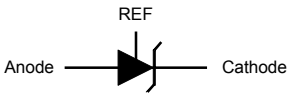
Features

- Precise Reference Voltage to 2.500V
- Guaranteed 0.5% or 1% Reference Voltage Tolerance
- Sink Current Capability , 1mA to 100mA
- Quick Turn-on
- Adjustable Output Voltage , $V_O = V_{REF}$ to 20V
- Low Operational Cathode Current , 250μA Typical
- 0.1Ω Typical Output Impedance
- SOT-23 , SOT-89 and TO-92 Packages

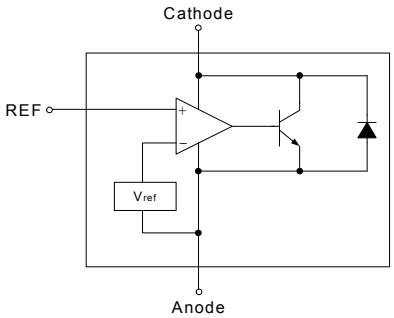
Applications

- Linear Regulators
- Adjustable Power Supply
- Switching Power Supply

Symbol

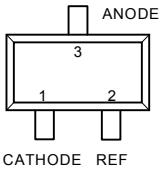


Functional Diagram

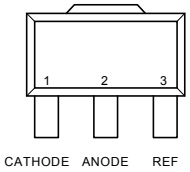


General Description

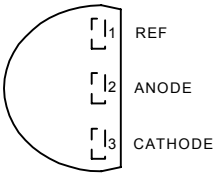
The APL1431 is a 3-terminal adjustable voltage reference with specified thermal stability over applicable commercial temperature ranges. Output voltage may be set to any value between V_{ref} (2.5 V) and 20 V with two external resistors (see Figure 2). When used with an photocoupler, the APL1431 is an ideal voltage reference in isolated feedback circuits for 2.5V to 12V switching-mode power supplies. This device has a typical output impedance of 0.1Ω. Active output circuitry provides a very sharp turn-on characteristic, making the APL1431 excellent replacements for zener diodes in many applications, including on-board regulation and adjustable power supplies.



SOT-23 (Top View)



SOT-89 (Top View)



TO-92 (Top View)

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Ordering and Marking Information

APL1431 □□□-□□ Handling Code Temp. Range Package Code Elec. Grade	Elec. Grade A : 0.5% Reference Voltage Tolerance B : 1% Reference Voltage Tolerance Package Code A : SOT-23 D : SOT-89 E : TO-92 Y : Chip Form Temp. Range C : 0 to 70 ° C I : -40 to 85 ° C Handling Code PB : Plastic Bag TB : Tape & Box TR : Tape & Reel
APL1431 A : 1431	APL1431 E : APL 1431 XXXXX XXXXX - Date Code
APL1431 D : APL1431 XXXXX XXXXX - Date Code	

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
V_{KA}	Cathode voltage		20	V
I_K	Continuous cathode current range		120	mA
I_{REF}	Reference current range		3	mA
θ_{JA}	Thermal Resistance from Junction to Ambient in Free Air			°C/W
		SOT-23	416	
		SOT-89	250	
		TO-92	250	
T_A	Ambient temperature range	APL1431XXC	0 to 70	°C
		APL1431XXI	-40 to 85	
T_j	Junction temperature range	APL1431XXC	0 to 150	°C
		APL1431XXI	-40 to 150	
T_{STG}	Storage Temperature Range		-65 to 150	°C
T_{SOL}	Lead temperature range, T_s (Soldering, 10sec)		260	°C

Electrical Characteristics T_A= 25°C (unless otherwise noted)

Symbol	Parameter	Test Conditions		APL1431 Min.	APL1431 Typ.	APL1431 Max.	Unit
V_{REF}	Reference voltage	$V_{KA}=V_{REF}$, I_K=10mA*1	APL431A	2.487	2.500	2.513	V
			APL431B	2.475	2.500	2.525	
$\Delta V_{REF}/T$	Reference voltage drift over temp. range	$V_{KA}=V_{REF}$, I_K=10mA					mV
		T_A= 0 to 70°C*1				20	
		T_A= -40 to 85°C*1				30	
$\Delta V_{REF} / \Delta V_{KA}$	Voltage ratio (open loop gain)	I_K=10mA, $V_{KA}=V_{REF}$ to 10V*2			-1.5	-3	mV/V
		I_K=10mA, $V_{KA}=V_{REF}$ to 20V*2			-1.2	-2.5	

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Electrical Characteristics Cont. T_A= 25°C (unless otherwise noted)

Symbol	Parameter	Test Conditions	APL1431			Unit
			Min.	Typ.	Max.	
I_{REF}	Reference current	I_K=10mA, R_1=10kΩ, R_2=open*2		1.0	3	μA
$\Delta I_{REF}/T$	Reference current drift	I_K=10mA, R_1=10kΩ, R_2=open, T_A= -40 to 85°C*2		0.3	1	μA
$I_{K(min)}$	Min. cathode current	$V_{KA}=V_{REF}$*1		0.25	0.5	mA
$I_{K(off)}$	Off-state cathode current	V_{KA}= 20V, V_{REF}= 0V*3		0.1	1	μA
$\|Z_{KA}\|$	Dynamic impedance	$V_{KA}=V_{REF}$ I_K=1mA to 100mA, f ≤1kHz*1		0.1	0.4	Ω
I_K	Cathode current	$V_{KA}=V_{REF}$+ 50mV*2			100	mA

Notes : *1 : use Figure 1
*2 : use Figure 2
*3 : use Figure 3

Test figures

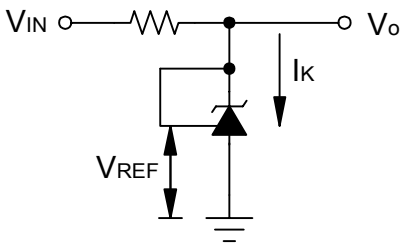


Figure 1. Test Circuit for $V_{KA}=V_{REF}$, $V_O=V_{KA}=V_{REF}$

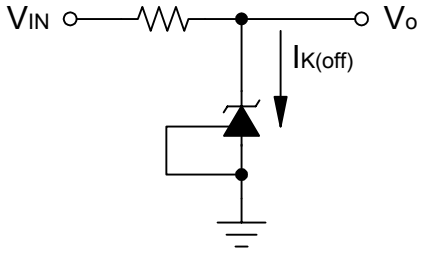


Figure 3. Test Circuit for $I_{K(off)}$

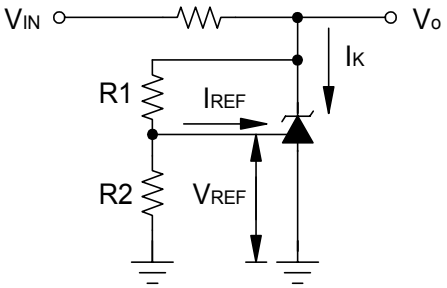
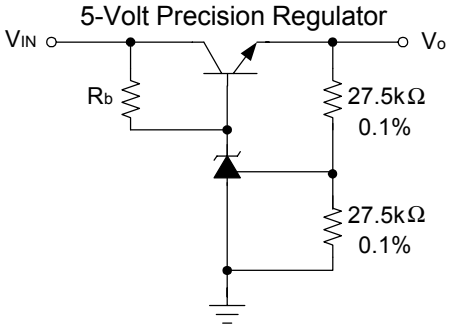


Figure 2. Test Circuit for $V_{KA}>V_{REF}$,
$V_O= V_{KA}= V_{REF}\times (1+R_1/R_2) + I_{REF}\times R_1$

Application schematic



* R_b should provide cathode current large than 1mA to maintain APL431 work properly.

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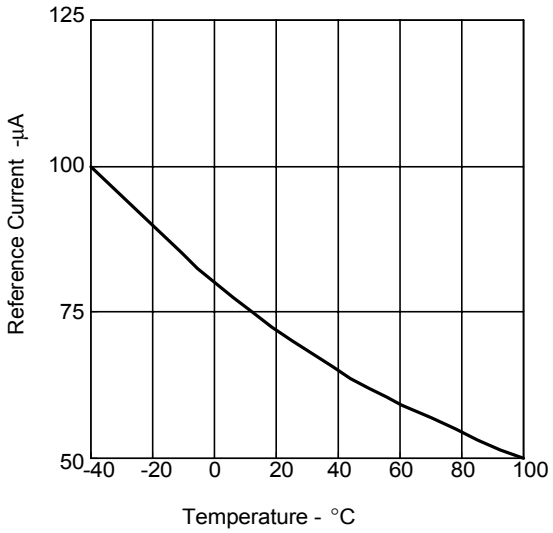
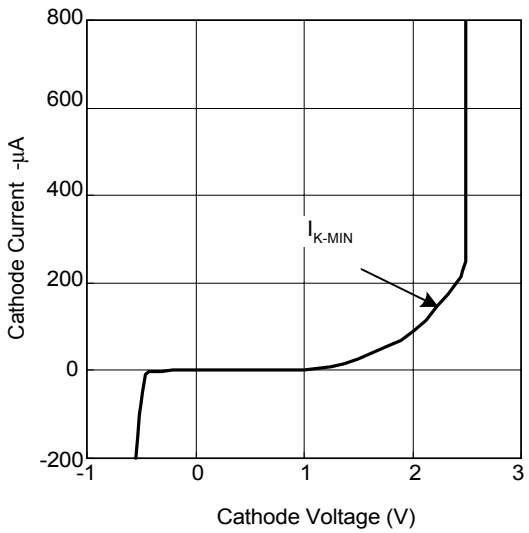
Typical Characteristics

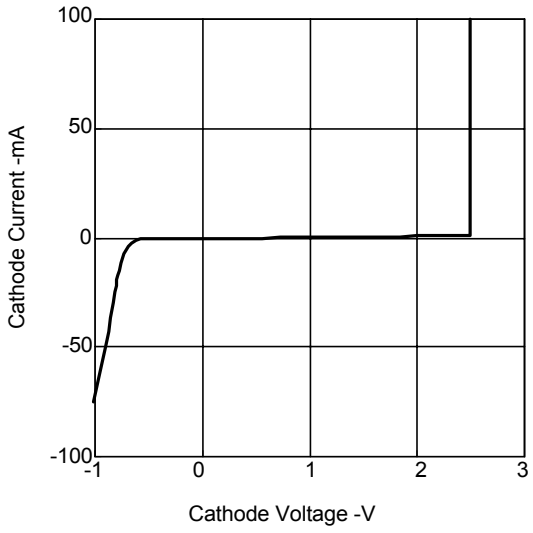
Reference Current vs.Temperature



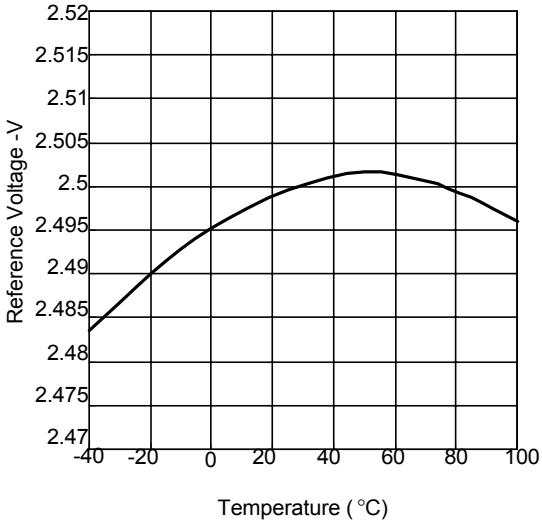
Cathode Current vs. Cathode Voltage



Cathode Current vs. Cathode Voltage

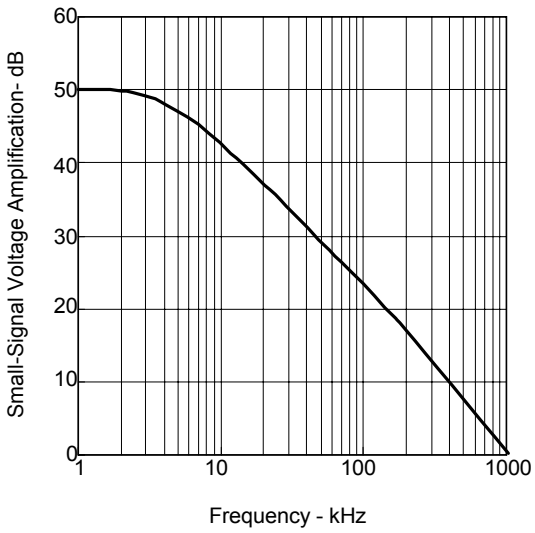


Reference Voltage vs. Temperature

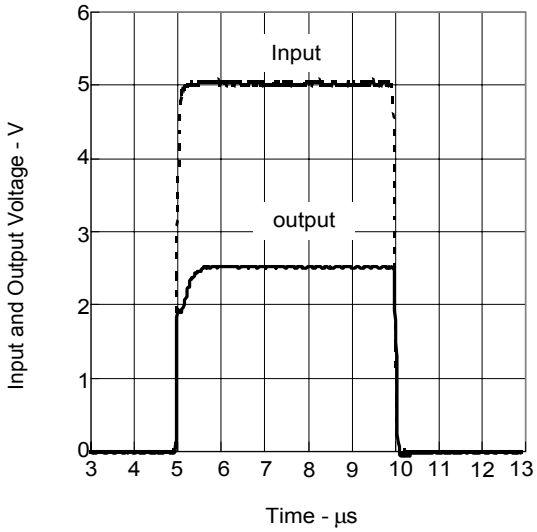


Typical Characteristics (Cont.)

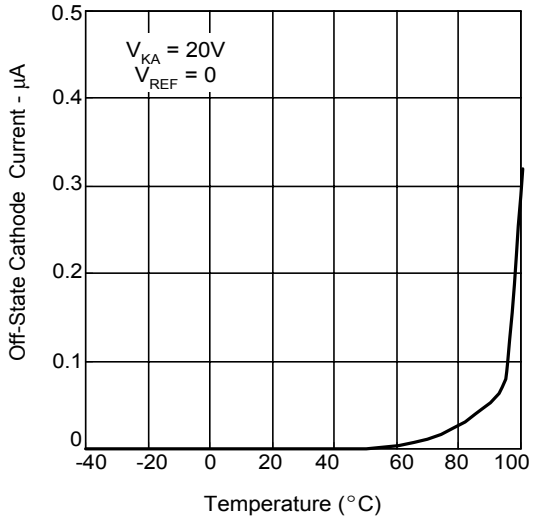
Small-Signal Voltage Amplification vs Frequency



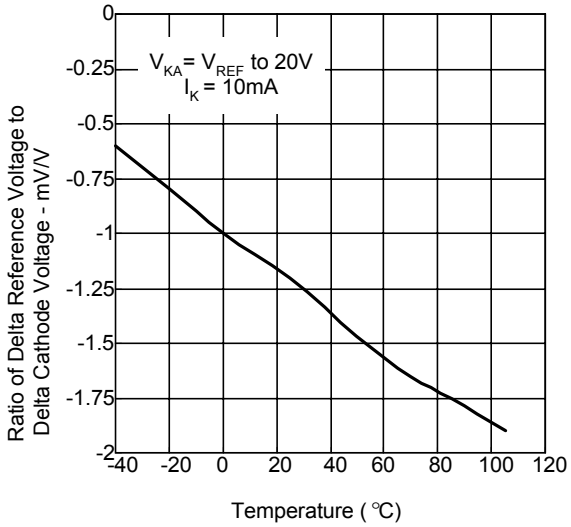
Pulse Response



Off-State Cathode Current vsTemperature



Ratio of Delta Reference Voltage to
Delta Cathode Voltage vs Temperature



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Typical Characteristics (Cont.)

Off-State Cathode Current vs Cathode Voltage

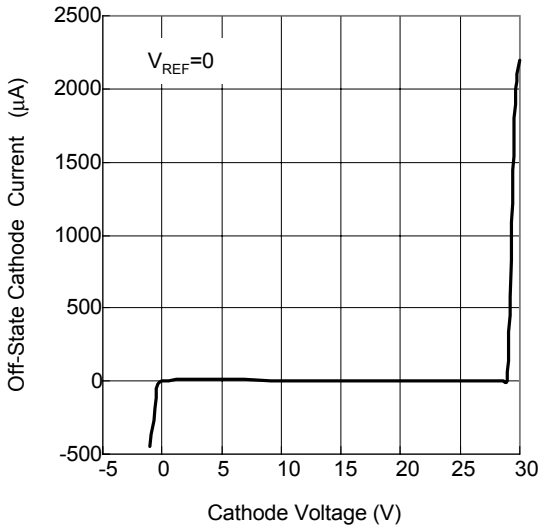


Figure 9

Reference Impedance vs Frequency

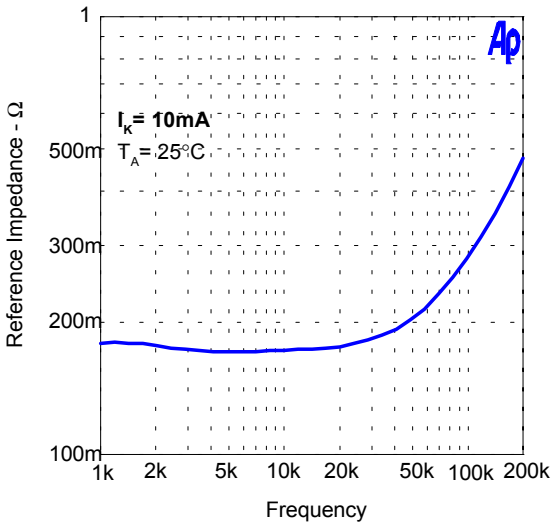


Figure 10

Stability Boundary Conditions

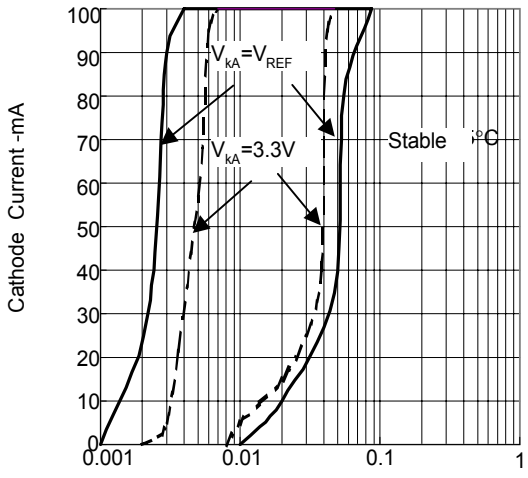
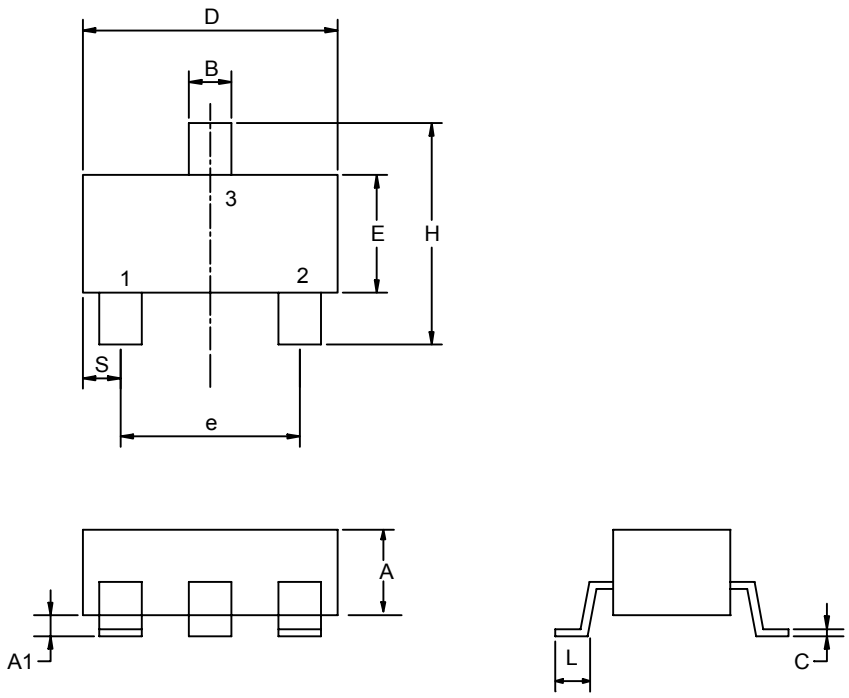


Figure 11

Packaging Information

SOT-23



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
B	0.35	0.51	0.014	0.020
C	0.10	0.25	0.004	0.010
D	2.70	3.10	0.106	0.122
E	1.40	1.80	0.055	0.071
e	1.90 BSC		0.075 BSC	
H	2.40	3.00	0.094	0.118
L	0.37		0.0015	

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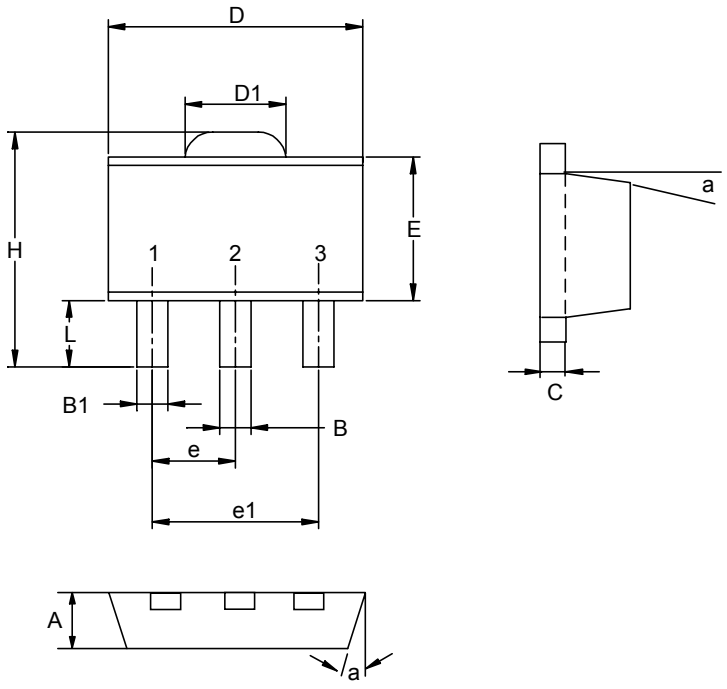
Packaging Information

SOT-89



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.40	1.60	0.055	0.063
B	0.40	0.56	0.016	0.022
B1	0.35	0.48	0.014	0.019
C	0.35	0.44	0.014	0.017
D	4.40	4.60	0.173	0.181
D1	1.35	1.83	0.053	0.072
e	1.50 BSC		0.059 BSC	
e1	3.00 BSC		0.118 BSC	
E	2.29	2.60	0.090	0.102
H	3.75	4.25	0.148	0.167
L	0.80	1.20	0.031	0.047
α		10°		10°

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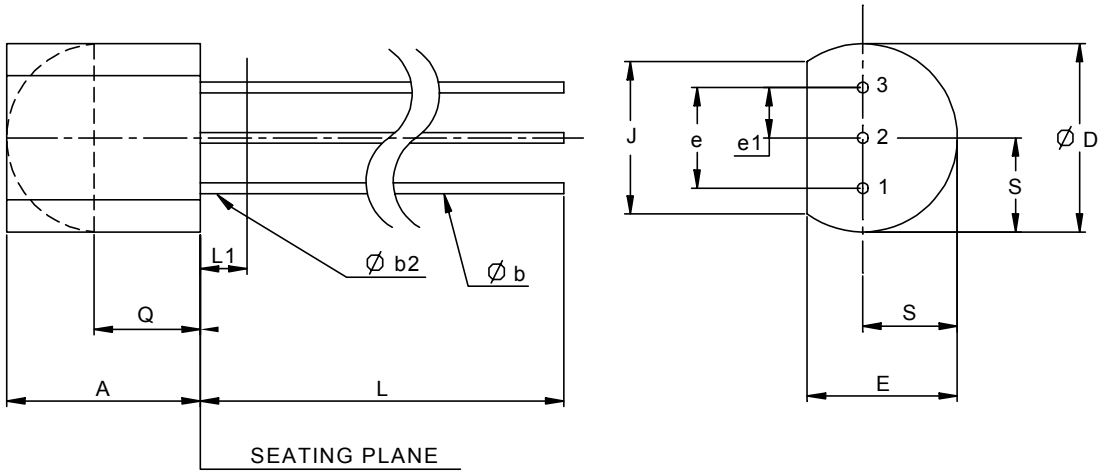
Packaging Information

TO-92



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.318	5.334	0.170	0.210
ϕ b	0.406	0.559	0.016	0.022
ϕ b2	0.406	0.559	0.016	0.022
ϕ D	4.445	5.207	0.175	0.205
E	3.175	4.191	0.125	0.165
e	2.413	2.667	0.095	0.105
e1	1.143	1.397	0.045	0.055
J	3.429		0.135	
L	12.70		0.500	
L1		1.27		0.050
Q	2.921		0.115	
S	2.032	2.667	0.080	0.105

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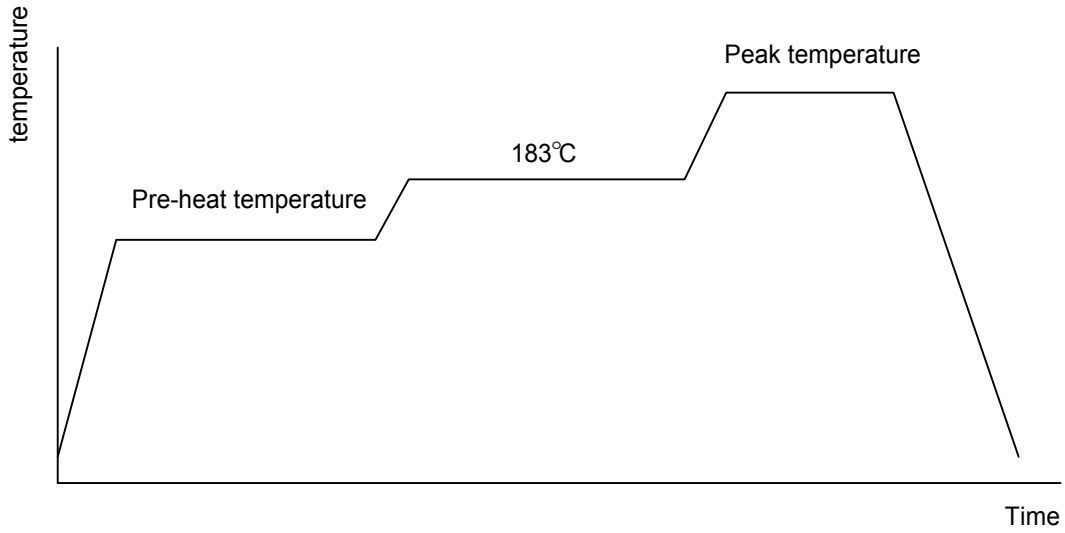
Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb)
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)

Reference JEDEC Standard J-STD-020A APRIL 1999



Classification Reflow Profiles

	Convection or IR/ Convection	VPR
Average ramp-up rate(183°C to Peak)	3°C/second max.	10 °C /second max.
Preheat temperature 125 ± 25°C)	120 seconds max	
Temperature maintained above 183°C	60 – 150 seconds	
Time within 5°C of actual peak temperature	10 –20 seconds	60 seconds
Peak temperature range	220 +5/-0°C or 235 +5/-0°C	215-219°C or 235 +5/-0°C
Ramp-down rate	6 °C /second max.	10 °C /second max.
Time 25°C to peak temperature	6 minutes max.	

Package Reflow Conditions

pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm³	pkg. thickness < 2.5mm and pkg. volume < 350mm³
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

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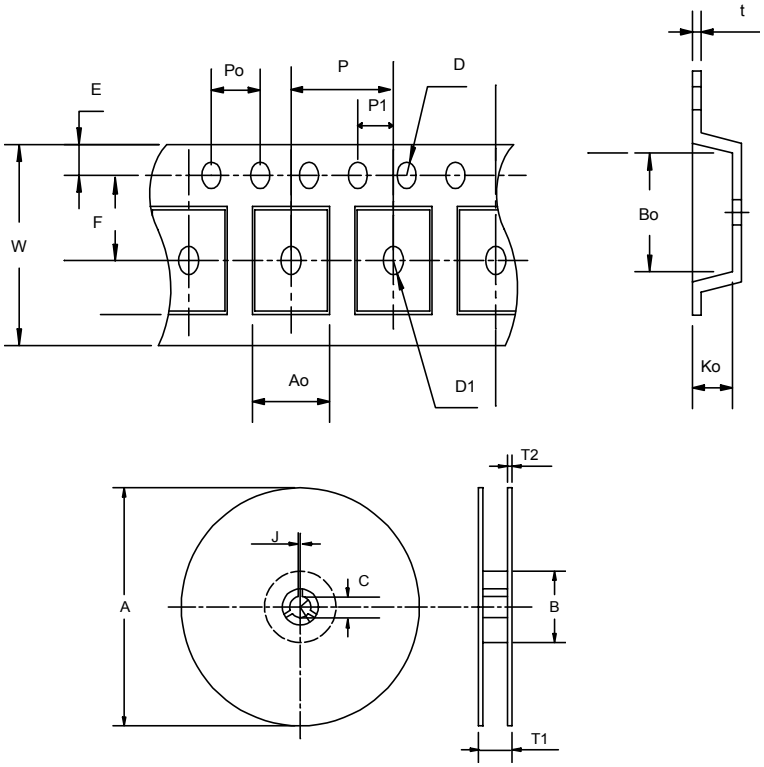
Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C , 5 SEC
HOLT	MIL-STD-883D-1005.7	1000 Hrs Bias @ 125 °C
PCT	JESD-22-B, A102	168 Hrs, 100 % RH , 121°C
TST	MIL-STD-883D-1011.9	-65°C ~ 150°C, 200 Cycles
ESD	MIL-STD-883D-3015.7	VHBM > 2KV, VMM > 200V
Latch-Up	JESD 78	10ms , I_{tr} > 100mA

Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	W	P	E
SOT-23	178±1	60 ± 1.0	12.0	2.5 ± 0.15	9.0 ± 0.5	1.4	8.0+ 0.3 - 0.3	4.0	1.75
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	3.5 ± 0.05	1.5 +0.1	φ 0.1MIN	4.0	2.0 ± 0.05	3.1	3.0	1.3	0.2±0.03
Application	A	B	C	J	T1	T2	W	P	E
SOT-89	178 ±1	70 ± 2	13.5 ± 0.15	3 ± 0.15	14 ± 2	1.3 ± 0.3	12 + 0.3 12 - 0.1	8 ± 0.1	1.75± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5 ± 0.05	1.5± 0.1	1.5± 0.1	4.0 ± 0.1	2.0 ± 0.1	4.8 ± 0.1	4.5± 0.1	1.80± 0.1	0.3±0.013

(mm)

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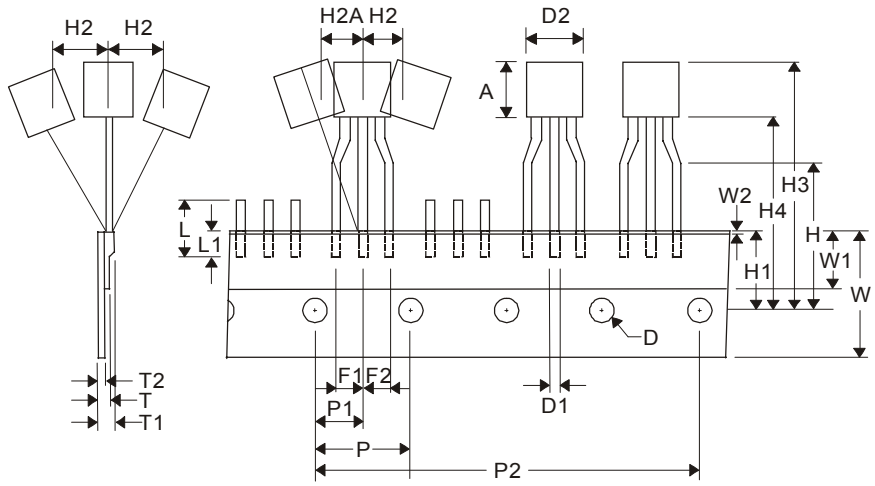
Carrier Tape & Reel Dimensions



Application	A	D	D1	D2	F1,F2	H	H1	H2	H2A
	3.18~12	4.0±0.2	0.36~0.53	9.0 MAX	2.5+0.2 -0.1	16±0.5	9±0.5	0.5 MAX	0.5 MAX
	H3	H4	L	L1	P	P1	P2	T	T1
TO-92	27.0 MAX	20.0 MAX	11.0 MAX	2.5 MIN	12.7±0.2	6.35±0.4	50.8±0.5	0.55 MAX	1.42 MAX
	T2	W	W1	W2					
	0.36~0.68	17.5~19	5.0~7.0	0.5 MAX					

(mm)

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOT- 23	8	5.3	3000
SOT- 89	12	9.3	1000
TO-92	17.5~19	5.0~7.0	2000

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